

HOW TO STUDY THE FLORIDA FLORA¹

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The British Isles are the most thoroughly botanized area in the world, and may well be taken as an ideal model. The new edition of Clapham, Tutin and Warburg's *Flora of the British Isles* (1962) is the culmination of nearly 450 years of activity by British botanists. In addition to the usual keys, recent synonymy, and full descriptions, the book contains a wealth of geographical and biological information, including chromosome numbers and pollinating agents. Add to this fine flora the companion series of *Illustrations* (three parts so far published), H. Godwin's *The History of the British Flora* (1956), and the *Atlas of the British Flora* by F. H. Perring and S. M. Walters (1962), and we are indeed well supplied with information about the British flora.

Although the combined area of the British Isles is a little more than twice that of Florida, their flora is much smaller, owing to the far northern latitude and history of total glaciation. For purposes of comparison we may take the total of 1,511 "good" (or Linnaean) native species given in J. E. Dandy's *List of British Vascular Plants* (1958). We have no accurate information as to the total in Florida except that it is very large, including on the one hand members of the cool-temperate Appalachian flora and tropical species on the other, together with one of the most notable concentrations of endemics in the continental United States. Considering all this floral wealth, and the rate at which new native species are still being found, I think it reasonable to estimate that the total native flora will run close to three times that of the British Isles, or not far from the totals known for Texas and for California.

Botanical knowledge cannot be accumulated without botanists, whether professional or amateur. The second edition of Britten and Boulger's *A Biographical Index of Deceased British and Irish Botanists* (by A. B. Rendle, 1931) lists more than 2,700 names. The first need for our ideal Florida Flora then is some 8,100 dead botanists. Time is required as well as manpower, and even though we deduct from the indicated 1,350 years the past 180 (stretching things some, for many of those years saw little or no progress at all with work on Florida plants), we are still left with more than a millennium of time as our second need. Floras are always tacitly assumed to refer to living plants, but as a practical working matter, they are primarily based on herbarium specimens. With these Britain is abundantly supplied: Kew reports 6 million, the British Museum has released no figures but is also huge, and Edinburgh claims

¹ All notes are at end of article.

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2 million. A combined total of more than 10 million would be a low estimate for the three principal institutions alone. A majority of these, to be sure, came from outside the British Isles. But it was necessary to have a world sample in order to delimit and organize the orders and families, and to establish the correct identity of species, while the constant influx of aliens means an ever-growing need for large collections of exotics. Since the organization of the world flora into orders and families has been reasonably well done for us, we may need much less than the indicated 30 million for the preparation of our ideal Florida Flora. But we still require vastly more than the combined total of less than 1/3 of a million currently held by the three principal herbariums in the state.

My calculations may seem unrealistic, but the facts behind them are worth citing to emphasize how very much needs to be done. We do not have even a simple list, still less an adequate manual for identification, while an encyclopedic reference work with everything down to the latest chemocytophytesis is hardly to be thought of at this stage. Where to begin? We may turn again to the British Isles for illumination.²

In the 1520's William Turner, a young medical student at Cambridge, undertook to describe wild herbs from direct observation, rather than accepting the authority of the Continental herbalists. Thus began the scientific study of the British flora. A century later, in the summer of 1629, a group of men led by Thomas Johnson made excursions from London to observe wild plants. Though most of them had some professional connection with medical practice, their trips had no specifically utilitarian purpose, but were made rather for the satisfaction of idle curiosity. Botany as a pure science had been born in Britain. By 1670 John Ray, Puritan divine and gifted amateur naturalist, was able to publish his *Catalogus Plantarum Angliae et Insularum Adjacentium*. The posthumous third edition of its successor, *Synopsis Methodica Stirpium Britannicarum*, in 1724, represents the high-water mark of pre-Linnaean botany. In 1762 William Hudson's *Flora Anglica* introduced Linnaean classification and binomial nomenclature. These were made available in the English language in 1776 in *A Botanical Arrangement of All the Vegetables Growing Naturally in Britain*, by William Withering.³ James Sowerby's *English Botany*, in 36 volumes (1790—1814; text by J. E. Smith, whose name does not appear in the earliest volumes), provided the first completely illustrated flora. In 1829 John Lindley's *A Synopsis of the British Flora* established the Natural System. For over a century afterward British botanists were to have available to them at all times a choice of several current floras, prepared by such men as the two Hookers, Bentham, and Babington, running through as many as eleven editions. With the publication of H. C. Watson's *Outline of the Geographical Distribution of British Plants* in 1832, particular attention was focussed on local studies, largely carried out by amateurs. In 1873

Watson's work was to appear in expanded form as his famous *Typographical Botany*, which in 1932 was replaced by G. C. Druce's *Comital Flora of the British Isles*. In 1928 E. J. Salisbury proposed a biological flora of Britain, but publication did not begin until 1941, as a series of papers in the *Journal of Ecology*, contributed by numerous authors. This is still in continuation and far from completion. The epoch-making first edition of Clapham, Tutin and Warburg's *Flora of the British Isles* in 1952 provided not only an up-to-date manual in the established tradition, but (so far as the limits of a compact, 1-volume work allowed) a biological flora as well, with details of distribution, habitat, life form, flowering time, abundance, pollination, and chromosome number. An abridged companion work, *Excursion Flora of the British Isles*, was published in 1959.

Most noteworthy is the fact that British botany begins with direct field study, and this remains a major feature of it down to the present. Not merely collecting specimens, but continuing observation, checking what is stated in books and filling in gaps in knowledge. This broad and solid factual foundation is something greatly to be envied—and a lesson to be taken to heart. Also enviable is the gradual and easy progress from simple to very complex and detailed investigation. In this respect we are not fortunate: we are confronted with the entire gamut of methods from the most elementary to the most advanced all at once. But there is something of a lesson for us here too. The best advanced work must have a solid basis on which to rest; until we have that basis, we must concentrate on producing it. So-called "alpha taxonomy" should come first; more specialized studies can follow. (I do not use the term "bio-systematics" for the latter, since it by no means includes all the possibilities; furthermore it is a term offensively misused by too many present-day American botanists who imagine that only those who use cytology or cytogenetics really know the biology of plants. The "old-fashioned" taxonomist employing data from ecology, geography, and phenology along with phenotype variations is in fact taking into account a broader range of biological information than many biosystematists do.) Historically suggestive also is the way in which one thing leads to another. For example, the floras of Hudson and Withering provided easy tools for local botanists to study the flora. If one looks over the list of British county and local floras, it is immediately clear that they do not begin to be produced in numbers until these pioneer floras have opened the door, and they later appear in flood proportions when a variety of manuals is available, with the added stimulus of H. C. Watson's and Druce's attention to geographical distribution. To be sure, economic and social factors were also involved—industrialization, rise in population, increasing wealth, greater ease of travel—but the existence of utility manuals was certainly a key factor in the great increase in local studies, which in turn made possible better general floras, along with promoting

an atmosphere favorable to giving both public and private support to professional botanists.

Perhaps at this point we ought to say something about what a flora is, or ought to be. It is first, and above all, a record of facts. What plant grows where, and when, is information wanted and need by agriculturists, horticulturists, field zoologists, conservationists, nature-lovers, geologists, biochemists, and a host of others. Floras do not exist merely for the attention of professional botanists. Their purpose is not to provide material for the diversion of phylogenists, or to gratify the disdain of biosystematists. It is a basic reference which serves a great variety of needs.

Writing a flora is a tedious and laborious job. We have seen what a stupendous amount of background activity precedes the writing of a really good one. Taxonomists are prone to seek relief from the strain, and "go a-whoring after strange gods." A recent illustration is C. W. James's paper, "Endemism in Florida" (*Brittonia* 13: 225—244, 1961). On the basis of selected, very incomplete evidence, the author seeks to explain Florida endemics and relics¹ as immigrants from Appalachia.² This was Fernald's naive theory of the origin of the Coastal Plain flora. Anyone who has studied the Texas flora realizes very quickly that such an explanation is quite inapplicable in the Gulf Southwest, and Florida and Texas have too much in common to suppose that an explanation unworkable for the one can be accepted for the other.³ One can only regret that the time spent by Dr. James in developing ill-founded speculations was not devoted instead to developing more foundations. His strictly taxonomic papers show that he is well able to do this. He has been too influenced in his thinking by the eastern Manual Ranges and the limited outlook of their dominating authors.

We may conclude that the best way to study the Florida flora is to begin by being a Texas botanist.

NOTES

¹Based on a talk given to the Life Sciences Seminar of the University of South Florida, Tampa, 13 December 1962. I wish to thank Drs. James D. Ray and Robert W. Long, who bravely invited me to speak, and heroically refrained from imposing any restrictions. I wish also to express my appreciation to Dr. Jerome O. Krivanek, who made a very spirited and able defense of Dr. James. It was a pleasure to have lively audience participation.

²There are very readable summaries of British botanical history in *British Botanists*, by John Gilmour (1946), and in *Wild Flowers: Botany in Britain*, by John Gilmour and Max Walters (new edition, 1955; see especially Chapter 2, "How Our Flora Was Discovered"). See also Nicholas Polunin's "British Floras Ancient and Modern," *Rhodora* 55: 209—224, 1953.

³To whom, it is said, this punning tribute was paid while he lay dying: "The Flower of British botany is Withering."

⁴A *relict* in good English means a widow; in Clementsian ecological gobbledegook it is a later homonym for *relic*.

⁵It has been suggested that isolated colonies of Coastal Plain species within the Appalachian highland represent ancestral stocks. I think a more likely explanation is just the reverse: they are late emigrants from the Coastal Plain. We know from geological evidence that the close of the Pleistocene was a period of vast flooding and erosion, with the develop-

ment of flood plains and terraces outside the glaciated area. It seems to me highly probable that the predominantly weedy Coastal Plain species were rapid invaders, spreading far out of the Coastal Plain itself (the handful of Coastal Plain species about the western Great Lakes are well known illustrations), to be replaced more gradually in succession by the Appalachian flora. The endemic *Conradina verticillata*, confined to a few spots on eroding stream banks in Kentucky and Tennessee, may represent a more ancient occurrence of the same thing. It is one of five shrubby species comprising the genus, all the rest of which are confined to the outer Coastal Plain.

⁶There have been shore lines and hence coastal plains, however small, for as long as sea and land have been differentiated. I see no reason to imagine that typical Coastal Plain plants ever had to exist anywhere else. In Texas such extreme endemics as the monotypic genera *Vaseyobloa* (Gramineae) and *Thurovia* (Compositae) must be very ancient, yet they occur on the very youngest sediments, and there is nothing to relate them to the Appalachian or Ozarkian or Sierra Madrean or any other upland flora. There are exactly comparable endemics in Florida, as well as such striking disjuncts as *Bonamia villosa*, occurring in both states. I consider the so-called Orange Island hypothesis, espoused by Woodson, not only possible and logical, but necessary.